

## REMARKS

### Substance of Interview

Elliot J. Mason (Reg. No. 56,569) and Eric Keller thank Examiner Angela A. Armstrong for the courtesy of the telephonic interview held on September 19, 2008. The substance of the interview included a discussion of the claims 1, 21, 47 and 48 and the cited publication, Riis et al, "Multilingual Text-to-Phoneme Mapping," Proceedings of the Eurospeech 2001 Conference. The rejection of claim 1 as anticipated by Riis and the rejection of claim 21 under 35 U.S.C. § 101 as well as possible amendments to claim 21 were discussed. While no definite agreement was reached on the allowability of the claims, tentative agreement was reached that the present amendment to claim 21 should overcome the 101 rejection, and that the 102 rejection of claim 48 would likely be withdrawn and further search performed.

### Potentially Allowable Claim 48

Claim 48, indicated as potentially allowable during the interview, has been rewritten in independent form including the limitations of claim 1 as previously pending before the present amendment.

### Claim Rejections

Claims 1-48 were pending, in which claims 1, 18, 19, 21, 28, 29, 41, 45 and 46 are independent. Independent claims 1, 18, 19, 21, 28, 29, 41, 45 and 46 have been amended. As such, claims 1-48 are pending and no new matter has been added by way of these amendments. Favorable reconsideration of the action mailed on July 27, 2008 is respectfully requested in view of the following comments of the Applicant, which are preceded by related comments of the Examiner in small bold type:

#### **Claim Rejections - 35 USC § 101**

**Claims 21-37 are rejected under 35 U.S.C. 101 because the claimed invention is direct to non-statutory subject matter.**

Independent claim 21 has been amended as discussed with the Examiner during the interview. As amended, claim 21 recites "[a] computer program product, tangibly embodied in a storage medium ...." The applicant respectfully requests withdrawal of this rejection.

**Claim Rejections - 35 USC § 102**

**Claims 1-46 are rejected under 35 U.S.C. 102(b) as being anticipated by Riis et al, "Multilingual Text-to-Phoneme Mapping," Proceedings of the Eurospeech 2001 Conference. (Claim 47 was also indicated as being rejected as anticipated by Riis during the interview.)**

Independent claim 1, as amended, calls for calculating *a single* acoustic subword model for each subword unit, based on the pronunciations in a plurality of sets of training words, by *mixing distributions of acoustic parameters representing the sounds of the subword unit in multiple languages* when a subword unit is common to two or more languages. Riis et al (hereinafter "Riis") is not understood to disclose or suggest this feature of independent claim 1.

In contrast, Riis describes a speech recognition system using acoustic phoneme models "based on a HMM/NN hybrid known as Hidden Neural Networks (HNN)." (Riis, Section 4.3.) The HNN architecture "replace[s] the Gaussian mixtures in *each state* of an HMM by *state specific* MLPs that have a single output and take speech feature vectors as inputs." (*Id.* (emphasis added).) "For phonemes shared by two or more languages the number of hidden units is equal to the number of languages sharing the phoneme." (*Id.*) Thus, the acoustic phoneme model for the system of Riis is a collection of MLPs, each modeling a pronunciation of the phoneme in a different language, and its size and complexity depend on the number of languages that share the phoneme. Further, because the HNN network for the phoneme is the acoustic model, any mixing that could be said to occur during forward decoding is not part of calculating the acoustic model. For these reasons, Riis is not understood to disclose or suggest calculating an acoustic subword model by mixing distributions of acoustic parameters representing the sounds of the subword unit in multiple languages. By way of example only, a potential advantage to an approach that "[mixes] distributions of acoustic parameters representing the sounds of the subword unit in multiple languages when a subword unit is common to two or more languages," is reduction of memory and processing cycles that would otherwise be needed to represent multiple acoustic models for a subword unit and search through a resulting larger set of acoustic representations of words in a recognition vocabulary.

Moreover, even if claim 1 were to be rejected under 35 U.S.C. 103(a) as unpatentable over Riis, Riis is understood to teach away from the claimed method. Riis explains in section 3:

Naturally, some letters are pronounced quite differently for different languages. The ML-TTP approach will therefore *only be successful if* the ML-TTP module is capable of producing *multiple, alternative* phoneme symbols for such letters.

(Riis, Section 3 (emphasis added).) Claim 1 recites calculating *a single* acoustic model for each subword unit by mixing distributions of acoustic parameters representing the sounds of the subword unit in multiple languages. Riis is understood to teach that such a method could not be successful. For this reason, the subject matter of claim 1 is not obvious in light of Riis.

The applicant respectfully submits that claim 1, as amended, is allowable.

Similarly, independent claim 18, as amended, requires using the mapping of sequences of sound to estimated pronunciations to generate acoustic subword models for the subword units in a grouping of subwords, by *mixing distributions of acoustic parameters representing the sounds of the subword unit in multiple languages* when a subword unit is common to two or more languages. (claim 18.) For at least the same reasons described above in relation to claim 1, Riis does not anticipate claim 18. The applicant respectfully submits that claim 18 is allowable as currently amended.

Similarly, independent claim 19, as amended, requires determining an acoustic word model for each of the words in a recognition vocabulary by mapping subword units in the estimated pronunciation to acoustic subword models, at least some of which *comprise a mix of distributions of acoustic parameters representing the sounds of the subword unit in multiple languages*, and combining the acoustic subword models. (claim 19.) For at least the same reasons described above in relation to claim 1, Riis does not anticipate claim 19. The applicant respectfully submits that claim 19 is allowable as currently amended.

Similarly, independent claim 21, as amended, requires causing a processing device to calculate an acoustic subword model for each subword unit, based on the pronunciations in a plurality of sets of training words, by *mixing distributions of acoustic parameters representing the sounds of the subword unit in multiple languages* when a subword unit is common to two or more languages. (claim 21.) For at least the same reasons described above in relation to claim 1, Riis does not anticipate claim 21. The applicant respectfully submits that claim 21 is allowable as currently amended.

Similarly, independent claim 38, as amended, requires causing a processing device to use a mapping of sequences of sound to estimated pronunciations to generate acoustic subword models for the subword units in a grouping of subwords, by *mixing distributions of acoustic parameters representing the sounds of the subword unit in multiple languages* when a subword unit is common to two or more languages. (claim 38.) For at least the same reasons described above in relation to claim 1, Riis does not anticipate claim 38. The applicant respectfully submits that claim 38 is allowable as currently amended.

Similarly, independent claim 39, as amended, requires causing a processing device to determine an acoustic word model for each of the words in a recognition vocabulary by mapping subword units in the estimated pronunciation to acoustic subword models, at least some of which comprise a *mix of distributions of acoustic parameters representing the sounds of the subword unit in multiple languages*, and combining the acoustic subword models. (claim 39.) For at least the same reasons described above in relation to claim 1, Riis does not anticipate claim 39. The applicant respectfully submits that claim 39 is allowable as currently amended.

Similarly, independent claim 41, as amended, requires a means for calculating an acoustic subword model for each subword unit, based on the pronunciations in a plurality of sets of training words, by *mixing distributions of acoustic parameters representing the sounds of the subword unit in multiple languages* when a subword unit is common to two or more languages. (claim 41.) For at least the same reasons described above in relation to claim 1, Riis does not anticipate claim 41. The applicant respectfully submits that claim 41 is allowable as currently amended.

Similarly, independent claim 45, as amended, requires a means for using a mapping of sequences of sound to estimated pronunciations to generate acoustic subword models for the subword units in a grouping of subwords, by *mixing distributions of acoustic parameters representing the sounds of the subword unit in multiple languages* when a subword unit is common to two or more languages. (claim 45.) For at least the same reasons described above in relation to claim 1, Riis does not anticipate claim 45. The applicant respectfully submits that claim 45 is allowable as currently amended.

Similarly, independent claim 46, as amended, requires a means for determining an acoustic word model for each of the words in a recognition vocabulary by mapping subword

units in the estimated pronunciation to acoustic subword models, at least some of which comprise a *mix of distributions of acoustic parameters representing the sounds of the subword unit in multiple languages*, and combining the acoustic subword models. (claim 46.) For at least the same reasons described above in relation to claim 1, Riis does not anticipate claim 46. The applicant respectfully submits that claim 46 is allowable as currently amended.

The dependent claims 2-17, 20, 22-37, 40, 42-44, and 47 are allowable at least for the reasons discussed in their respective independent claims. Although it is believed that the dependent claims define patentably distinct features, given the distinctiveness of the respective independent claims, the dependent claims are not discussed here in detail.

It is believed that all of the pending claims have been addressed. However, the absence of a reply to a specific rejection, issue or comment does not signify agreement with or concession of that rejection, issue or comment. In addition, because the arguments made above may not be exhaustive, there may be reasons for patentability of any or all pending claims (or other claims) that have not been expressed. Finally, nothing in this paper should be construed as an intent to concede any issue with regard to any claim, except as specifically stated in this paper, and the amendment of any claim does not necessarily signify concession of unpatentability of the claim prior to its amendment.

In view of the foregoing remarks, the entire application is now believed to be in condition for allowance, and such action is respectfully requested at the Examiner's earliest convenience.

Applicant's attorney can be reached at the address shown below. Telephone calls regarding this application should be directed to 617-521-7075.

\$210 for excess claim fees is being paid concurrently herewith on the Electronic Filing System (EFS) by way of Deposit Account Authorization. Please apply any charges or credits to deposit account 06-1050, referencing attorney docket no. 10663-018001.

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Respectfully submitted,

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